

## **What will LADEE tell us about the lunar atmosphere?**

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NASA Lunar Science Forum Abstract, AMES Research Center, July 2011.

The only species that have been confirmed in the lunar exosphere are Na, K, Ar, and He. However, models for the production and loss of lunar regolith-derived exospheric species from source processes including micrometeoroid impact vaporization, sputtering, and, for Na and K, photon-stimulated desorption, predict a host of other species should exist in the lunar exosphere. Assuming that loss processes are limited to ballistic escape, photoionization, and recycling to the surface, we have computed column abundances and compared them to published upper limits from the Moon and to detected abundances from Mercury. Our results suggest that available measurements often do not constrain models, and underline the need for improved spectroscopic measurements of the lunar exosphere. Such investigations are planned by the Lunar Atmosphere and Dust Environment Explorer (LADEE) spacecraft. Our calculations indicate that LADEE measurements promise to make definitive observations or set stringent upper limits for all regolith-driven exospheric species because of their favorable signal to noise ratio. Our models, along with LADEE observations, will constrain assumed model parameters for the Moon, such as sticking coefficients, source processes, and velocity distributions.